PATENT APPLICATION

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re the Application of

Simon Peter KNIGHTLEY et al. Group Art Unit: 1794

Application No.: 10/578,499 Examiner: P. CHOI

Filed: October 2, 2006 Docket No.: 127954

For: MAT FOR REDUCING THE DISTURBANCE OF PARTICULATE MATTER AND LIQUIDS BY WIND

DECLARATION UNDER 37 C.F.R. §1.132

I, Gregory Norman PETERS, a citizen of Australia, residing at 2/8 Schofield Street, Moorabin, Victoria 3189, Australia, hereby declare and state:

1. I have a degree in economics that was conferred upon me by Monash University in Melbourne, Australia in 1979.

2. I have been employed as a consultant by C Gear Australia Pty Ltd since May 2003, firstly in a business role and then in a technical development role. I have had a total of 7 years of work and product design experience in multilayer mats intended for use on sand or other particulate matter.

3. I am a named inventor in the above-captioned patent application.

4. I have a professional relationship with the assignee of the above-identified patent application. In the course of that professional relationship, I received compensation directly from the assignee for my work relating to the design of the mat subject of the above-identified patent application. I am not being compensated for my work in connection with this Declaration.

5. I have been asked by the patent attorneys involved with the preparation and prosecution of the above-captioned application to comment on the nature of the claimed subject matter of the above-captioned patent application, and the considerations that my fellow inventors and I made to develop the claimed subject matter.

6. As explained in the description of the above-captioned patent application, dust and other particulate matter can present significant hazards to the operators of a rotary wing aircraft. During take-off and landing, and during near-ground hovering, clouds of dust or other particles can be generated around a helicopter. This can result in loss of visibility or "brown-out" in the case of dust or sand, or "white-out" in the case of snow. Particles can clog the air intakes of an aircraft's engines, resulting in overheating, and fine particles ingested through the engines can cause damage and mechanical failures. Particles can cause accelerated wear-and-tear on rotors and rotor gear. Coarser airborne particles can cause eye injuries and other types of injuries to people near the aircraft, and other aircraft, vehicles, equipment and facilities in the area can be damaged.

7. Helicopter landing pads are typically constructed from concrete, asphalt, bitumen or another solid surface. When, however, it is necessary to land at a site that does not have a solid landing pad, problems with dust and other particles often arise. One solution has been to create a portable landing pad, and such a portable landing pad is typically made from steel or some other strong, and relatively solid and heavy material which is not likely to be blown away by the helicopter's downdraft. However, such a landing pad is very cumbersome to transport and move around, and is unsuitable for rapid deployment.

8. One manner of constructing a short-term helicopter landing pad on a dusty or sandy surface involves spraying the surface with water. The effectiveness of this technique depends on having sufficient water available, and the landing surface ceases to be usable once the water dries, which may only be a matter of minutes in some environments. A longer term

landing pad may be created using sump oil, diesel fuel or another non-volatile liquid, but the effectiveness is still short-lived. It is necessary to have a supply of oil or diesel fuel available, and the environmental damage is significant. A more environmentally friendly solution is provided by a product known as Envirotac II, or "Rhino Snot," but this still requires a supply to be available when needed.

9. Landing pads are typically not made out of cloth materials such as canvas or PVC tarpaulins, because of the dangers associated with the cloth flapping up and getting caught in the helicopter's rotors. Even if a canvas tarpaulin were firmly anchored down on every side, there is still the possibility that in a heavy landing a helicopter's skids or wheels might tear the canvas, especially when the ground contains some exposed rock, and the helicopter's downdraft on the torn portion of the canvas would cause air to flow under the canvas, lifting the canvas, causing additional strain on the anchor points, and accentuating the tear, with the attendant risk that a torn portion of the canvas will be caught up in the helicopter's rotors.

10. In some military operations, landing mats are made of aluminum sheet (which may be fabric-like, rather than rigid metal). Aluminum is less hazardous than canvas, but there are significant difficulties and dangers experienced with wind getting under the mats, or blowing the mats or pieces of mat around, resulting in injury to people on the ground as well as endangering the helicopter.

11. A further long-felt problem associated with the use of a flexible landing pad arises from the effect of the helicopter's downdraft on the edges of the landing pad. As the helicopter's downdraft nears the ground, it is directed outwardly, so that the airflow near the edges of the landing pad is rapid and nearly horizontal. The rapidly flowing air on the top side of the landing pad has a lower pressure than the still air on the underside of the landing pad, and this causes an "uplift" effect whereby the edges of the landing pad flap up. In the

past, this problem has been dealt with by making the edges of the landing pad so heavy that they cannot be moved by the airflow, but this significantly reduces the portability of the landing pad. Alternatively, large, heavy pegs are used to secure the landing pads, but these make the pads less portable and more time-consuming to set up or pack away.

12. The US Army has used a temporary road-surfacing type of matting known as "Mobi-Mat." Mobi-Mat is essentially a solid plastic material that is impermeable to air. It is typically stored in large rolls that are bulky and heavy, and in use 1-meter pegs hold down the mats. Standard mat sizes are 4.2 m wide, 0.4 m thick, and 8 m, 12 m or 20 m long. When unrolled, each mat forms a 0.4 m thick flat structure, which is at least partially load bearing. The 8 m mats weigh 56.5 kg, the 12 m mats weigh 84 kg and the 20 m mats weigh 149 kg. Each mat therefore requires two or more people to carry it.

13. My fellow inventors and I endeavored to develop a portable helicopter landing mat suitable for use by the military in the desert, snow, marshlands and other similar environments.

14. My fellow inventors and I wondered if there was some way in which we could develop a helicopter landing pad made from a light-weight (and therefore easily transportable) mesh material, but which would avoid severe flapping up at the edges during helicopter landing and did not necessarily require heavy pegging or anchoring.

15. We came up with the idea that perhaps we could use the aerodynamic effect of a helicopter landing on a mat to somehow assist, rather than hinder, the performance of the mat. We thought that we could stop the edge flapping and prevent the majority of the particulate matter under the mat from escaping, if we could develop a mat which would allow a suitable amount of wind to pass through the mat. We thought that this would reduce the pressure differentials between the top and bottom sides of the mat, making the mat much less

susceptible to tears and more able to endure strong winds than a comparable mat made from non-porous cloths such as canvas.

16. In order to test our idea, we developed a prototype two-layer mat from a mesh material having an average stitch length of around 3 mm, and porosity of each layer of mesh material of around 30%. We were able to roughly determine that the average separation between the two layers varied from around 2 to 10 mm. The separation between layers of the mesh material in the mat varies over the extent of the mat, according to the underlying terrain, wind, and a range of other factors. The "average separation" between layers is a measure of by how much, on average, the separation between the layers of the mesh material in the mat varies.

17. During testing, we observed that our two-layer prototype mat operated well. Upon close inspection during testing, it seemed to us that a divergent "tumbling" effect of wind striking the surface of the mat had been created by the textile pattern of the mesh material. This "tumbling" effect of wind was the aerodynamically helpful effect we were looking for. This "tumbling" effect acted to push the mat onto the ground, rather than creating an "uplift" effect, and minimized the need for heavy pegging or anchoring.

18. From my experience in this field, I would expect that a two-layer mat exhibiting these same properties could also be made from a mesh material having an average stitch length of between 2 to 6 mm, and a porosity of between 10% and 50%. However, I would expect that outside of these ranges the mesh material would either (i) not allow enough wind to pass through the mat to reduce the pressure differentials between the top and bottom sides of the mat, resulting in tears to the mat, or (ii) allow too much wind to pass through the mat, thus resulting in a "brown out" from the underlying sand or other particulate matter being blown up through and/or around the sides of the mat.

19. I have attached a color photograph of several mats according to the claimed subject matter, which have been interconnected to form a single helicopter landing mat. It can be observed that, just before landing of a helicopter, there is no "uplift" effect and no "brown-out" over the extent of the helicopter landing mat. The helicopter landing mat is only lightly pegged.

I hereby declare that all statements made herein of my own knowledge are true, and that all statements made on information and belief are believed to be true; and further that these statements were made with the knowledge that willful false statements and the like so made are punishable by fine and/or imprisonment under Section 1001 of Title 18 of the United States Code, and that such willful false statements may jeopardize the validity of the application or any patent issuing therefrom.

Date: 28/6/10

Gregory Norman PETERS

Attachment:
Color Photograph